

PATENT

Serial No. C9/918,831

Amendment in Reply to Final Office Action of August 23, 2005

IN THE CLAIMS

Please amend claims 1 and 6 as follows:

1 1. (Currently Amended) A method of generating a linear
2 | transformation matrix A by a device for use in a symmetric-key
3 | cipher, the method including:
4 generating a binary $[n, k, d]$ error-correcting code, represented
5 | by a generator matrix $G \in \mathbb{Z}_2^{k \times n}$ in a standard form $G = (I_k | B)$, with
6 | $B \in \mathbb{Z}_2^{k \times (n-k)}$, where $k < n < 2k$, and d is the minimum distance of the
7 | binary error-correcting code;
8 | shortening said error-correcting code; and
9 extending matrix B with $2k-n$ columns such that a resulting
10 | matrix C is non-singular, and
11 | deriving matrix A from matrix C.

1 2. (Previously Presented) A method as claimed in claim 1,
2 | wherein extending matrix B with $2k-n$ columns includes:
3 | in an iterative manner:
4 | randomly generating $2k-n$ columns, each with k binary

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5 elements;

6 forming a test matrix consisting of the $n-k$ columns of B
7 and the $2k-n$ generated columns; and

8 checking whether the test matrix is non-singular,
9 until a non-singular test matrix has been found; and
10 using the found test matrix as matrix C.

1 3. (Previously Presented) A method as claimed in claim 1,
2 wherein deriving matrix A from matrix C includes:

3 determining two permutation matrices $P_1, P_2 \in Z_2^{k \times k}$ such that
4 all codewords in an $[2k, k, d]$ error-correcting code, represented by
5 the generator matrix $(I \parallel P_1 \ C \ P_2)$, have a predetermined multi-
6 bit weight; and
7 using $P_1 \ C \ P_2$ as matrix.

1 4. (Original) A method as claimed in claim 3, wherein the
2 cipher includes a round function with an S-box layer with S-boxes
3 operating on m -bit sub-blocks, and the minimum predetermined multi-
4 bit weight over all non-zero codewords equals a predetermined m -bit
5 weight.

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1 5. (Previously Presented) A method as claimed in claim 3,
2 wherein determining the two permutation matrices P_1 and P_2 includes
3 iteratively generating the matrices in a random manner.

1 6. (Currently Amended) A method as claimed in claim 1, wherein
2 the cipher includes a round function operating on 32-bit blocks and
3 wherein the step of generating a $[n, k, d]$ error-correcting code
4 includes:

5 generating a binary extended Bose-Chaudhuri-Hocquenghem
6 (XBCH) $[64, 36, 12]$ code; and

7 said shortening includes shortening this code to a $[60,$
8 $32, 12]$ shortened XBCH code by deleting four rows.

1 7. (Original) A computer program product, wherein the program
2 product is operative to cause a processor to perform the method of
3 claim 1.

1 8. (Previously Presented) A system for cryptographically
2 converting an input data block into an output data block; the data
3 blocks comprising n data bits; the system including:
4 an input for receiving the input data block;

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5 a storage for storing a linear transformation matrix A,
6 generated according to the method of claim 1,
7 a cryptographic processor performing a linear transformation
8 on the input data block or a derivative of the input data block
9 using the linear transformation matrix A; and
10 an output for outputting the processed input data block.

Claims 9-10 (Canceled)